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RECOVERY POTENTIAL ASSESSMENT FOR NORTHERN BOTTLENOSE WHALES (*HYPEROODON AMPULLATUS*) IN CANADA

Photo credit: Jefferson, T.A., S. Leatherwood, and M.A. Webber. 1993. FAO species identification guide. Marine mammals of the world. Rome

Figure 1: Approximate distribution of Northern Bottlenose Whale sightings in Canadian waters.

Context:

In April 1993, the northern bottlenose whale (Hyperoodon ampullatus) was given a single designation of Not at Risk by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). In April 1996, the whales were split into two populations to allow a separate designation of the Scotian Shelf population. The Davis Strait population has not been reassessed since it was designated Not at Risk in 1993. The Scotian Shelf population was designated Special Concern by COSEWIC in 1996. Its status was uplisted to Endangered in November 2002 and added to Schedule 1 of the Species at Risk Act (SARA) *in 2006.*

Both the Scotian Shelf and the Davis Strait populations are scheduled for reassessment by COSEWIC in their April 2011 meeting. In anticipation of COSEWIC's assessment, Fisheries and Oceans Canada (DFO) conducted a Recovery Potential Assessment (RPA) in November 2010. This RPA will inform the Species at Risk Act (SARA) listing decision by the federal Governor in Council (GiC), socio-economic analyses, and consultations with the public. Should either of the northern bottlenose whale populations be listed as Threatened or Endangered under the SARA, the RPA will also inform the recovery strategy(ies).

Canada

SUMMARY

- COSEWIC recognises two populations of northern bottlenose whales in Canada: the Scotian Shelf population and the Davis Strait population.
- The most recent published population estimate (average population estimate for the 1988 to 2003 period) for the Scotian Shelf is 163 individuals (95% confidence interval 119–214). There was no trend in abundance during that period.
- The Scotian Shelf population ranges from Georges Bank to the Eastern Scotian Shelf. Sightings are highly aggregated in the Gully, Haldimand Canyon and Shortland Canyon. There is no evidence that range has decreased.
- The recovery target for the Scotian Shelf population is to maintain a stable or increasing population and to maintain, at a minimum, current distribution.
- There is no estimate of abundance for the Davis Strait population. Recent vessel-based and aerial survey efforts yielded few sightings. It is likely that this long-lived species is still recovering from whaling.
- The Davis Strait population ranges from the Labrador Sea to southern Baffin Bay. Sightings are aggregated in the deep waters of the Davis Strait along the shelf edge, from the mouth of Hudson Strait to the mouth of Cumberland Sound.
- In light of the paucity of information on a secure population size, the proposed recovery target for the Davis Strait population is to achieve an increasing population size and to maintain, at a minimum, current distribution. Given that 818 whales were removed by whalers between 1969 and 1971, a minimum target would be a population size greater than this.
- The whales' primary prey item is deepwater squid from the genus *Gonatus*.
- Habitat is characterised by waters of more than 500 metres in bottom depth, particularly around steep-sided features, which provide access to sufficient accumulations of prey (*Gonatus* squid).
- Zone 1 of the Gully Marine Protected Area and areas with water depths of more than 500 metres in Haldimand Canyon and Shortland Canyon have been declared Critical Habitat for the Scotian Shelf population.
- Northern bottlenose whales do not have any known dwelling-place similar to a den or nest during any part of their life cycle; hence, the concept of "residence" does not apply.
- Threats include entanglement/bycatch in fishing gear and ocean noise (particularly from oil and gas exploration and extraction).
- No full commercial seismic exploration programs are occurring or planned in either centre of distribution. Haldimand and Shortland canyons are considered areas of potential for oil and gas extraction. DFO has a Statement of Canadian Practice on the Mitigation of Seismic Noise in the Marine Environment, although the mitigation measures therein may be insufficient for northern bottlenose whales. The Canadian Navy has developed marine mammal mitigation procedures to follow when conducting Exercises-Operations that involve the use of Underwater Sound Generating Systems.
- There have been nine reported entanglements of northern bottlenose whales in the past 30 years. Two of the fisheries implicated are no longer prosecuted. This is the only documented source of human-induced harm or mortality in Canada. Potential mitigation measures include education of members of fishing industry on safe handling and release techniques and on the risks associated with feeding whales. Area closures could be used should areas of high entanglement risk be identified.
- The stock origin of whales off Newfoundland is not known.

BACKGROUND

Rationale for Assessment

The *SARA* is intended to protect species at risk of extinction in Canada and promote their recovery. The *SARA* includes prohibitions on killing, harming, harassing, capturing, or taking individuals of species listed as Threatened or Endangered on *Schedule 1*. The *SARA* prohibits sale or trade of individuals of such species (or their parts), damage or destruction of their residences, or destruction of their critical habitat. The *SARA* also specifies that a recovery strategy must be prepared for species that are listed as Threatened or Endangered. The provisions of these recovery strategies will have to address all potential sources of harm, including harvesting activities, so that the survival and recovery of the populations concerned are not jeopardised.

Section 73 (2) of the SARA provides the competent Ministers with the authority to permit normally prohibited activities affecting a listed species, its critical habitat, or its residence, even when they are not part of a previously approved recovery plan. Such activities can only be approved if: 1) there is scientific research relating to the conservation of the species and conducted by qualified persons; 2) they will benefit the species or are required to enhance its chance of survival in the wild; or 3) affecting the species is incidental to carrying them out.

The decision to permit allowable harm must consider the species' current situation and its recovery potential, the impacts of human activities on the species and its ability to recover, as well as alternatives and measures to reduce these impacts to a level that will not jeopardise the survival and recovery of the species. Therefore, the RPA process was established by DFO Science in order to provide the information and scientific advice required to meet these various requirements. In the case of a species that has not yet been added to *Schedule 1*, the scientific information also could contribute to the decision as to whether or not to add the species to the list. Consequently, the information is used when analyzing the socio-economic impacts of adding the species to the list as well as during subsequent consultations, where applicable.

Historical Whaling

Northern bottlenose whales were exploited by three groups in Canadian waters. From 1877 to 1893, British whalers hunted in the vicinity of Cumberland Sound, Davis Strait, and the waters off Greenland, and reported approximately 1669 kills. The Norwegians entered the northern bottlenose whale hunt in the late 1800s and targeted whales in the northeastern Atlantic. Between 1969 and 1971, the Norwegians took 818 whales off Labrador. The hunt took place mainly between April and June (Benjaminsen and Christensen 1979). They have not hunted this species since 1973. A Canadian hunt based out of Blandford, Nova Scotia, took place between 1962 and 1967. During this period, 87 whales were taken from the Scotian Shelf population. All georeferenced records (25) from this hunt were from the Gully.

Species Ecology

The northern bottlenose whale is a beaked whale that ranges in length from about 7 to 9 metres at maturity. Males have a larger head, relative to body size, and a squared forehead, while females and immature males have a much more rounded forehead. Peak mating appears to occur in July and August for the Scotian Shelf population of northern bottlenose whales and pregnant females give birth to a single calf one year later. In contrast, the Davis Strait population mates and calves between April and June, with a peak in April. The Davis Strait

population is believed to have a two-year breeding cycle. The reproductive cycle of the Scotian Shelf population has not been examined in detail, but fewer calves are observed in the population than expected if mature females calved every other year. The whales can live up to about 40 years old.

Northern bottlenose whales are found only in the northern North Atlantic, occurring in cool and subarctic waters. They are distributed from Nova Scotia to the Davis Strait, across the North Atlantic along the east coast of Greenland, and from Great Britain to the west coast of Spitzbergen. They are distributed in the western Atlantic along the eastern Scotian Shelf and the shelf edge of the northern Grand Banks, and up to Davis Strait. The whales on the Scotian Shelf, which are considered a distinct population, are highly aggregated. They are a deep-water species. On the Scotian Shelf, northern bottlenose whales have been sighted most often in the deep waters of three underwater canyons (the Gully, Shortland Canyon, and Haldimand Canyon) along the shelf edge. They are year-round residents.

The Davis Strait population appears to be concentrated in the deep waters of the Davis Strait along the shelf edge, from the mouth of Hudson Strait to the mouth of Cumberland Sound. Whalers made most of their catch in waters greater than 1000m in depth, with very few caught on the continental shelf. Whales have been sighted in all seasons in the Davis Strait.

Compared to other deep-diving squid-eaters, northern bottlenose whales appear to have a much more specialised diet. Their primary prey item is deepwater squid from the genus *Gonatus*. The Scotian Shelf population is believed to consume primarily *Gonatus steenstrupi*, while the Davis Strait population feed on *Gonatus fabricii*. In addition to *Gonatus* squid, fish and other invertebrates are eaten though in much smaller quantities.

Northern bottlenose whales have few predators apart from humans. Whaling crews have observed killer whales attacking and feeding on individuals, but these were considered unusual events.

ASSESSMENT/ANALYSIS

Current Status and Trends

Abundance has been estimated for the Scotian Shelf population from photo-identification data using mark-recapture models. The average population estimate for the 1988 to 2003 period is 163 individuals (95% confidence interval 119–214). There is no statistically significant trend in abundance in the models.

There are no abundance estimates for the Davis Strait population of northern bottlenose whale. Approximately 818 whales were removed between 1969 and 1971 by Norwegian whalers. Recent vessel-based and aerial surveys yielded few sightings.

Habitat Requirements and Residences

Submarine canyons, which are narrow, deep, and steep-sided features, appear to play a key role in determining the distribution of northern bottlenose whales on the Scotian Shelf. It appears that this is because they provide rich foraging habitat, and therefore, allow the whales to congregate and carry out life processes (e.g., mating and rearing).

Northern bottlenose whale habitat is characterised by waters of more than 500 metres in bottom depth, particularly around steep-sided features, such as underwater canyons and continental slope edge. Access to sufficient accumulations of prey (*Gonatus* squid) to allow northern bottlenose whales not only to meet their individual caloric requirements, but also to socialise, mate, and rear their young is also thought to determine habitat.

The Critical Habitat Statement for the Scotian Shelf population identifies the entirety of Zone 1 of the Gully Marine Protected Area and areas with water depths of more than 500 metres in Haldimand Canyon and Shortland Canyon as Critical Habitat for the Scotian Shelf population. Since northern bottlenose whales use the full depth range in these areas, breathing and socializing at the surface and diving to feed at or near the bottom, critical habitat for this species should be considered to include the entire water column and the seafloor.

Under the *Species At Risk Act*, Threatened and Endangered species' residences are protected. In Section 2 (1) the act defines residence as:

> "...a dwelling-place, such as a den, nest or other similar area or place, that is occupied or habitually occupied by one or more individuals during all or part of their life cycles, including breeding, rearing, staging, wintering, feeding or hibernating..."

Northern bottlenose whales do not have any known dwelling-place similar to a den or nest during any part of their life cycle; hence, the concept of "residence" does not apply.

Targets for Recovery

A numerical recovery target for either population cannot de determined because it is not known what a pristine population size may have been or the extent the population was affected by whaling.

It is not clear what abundance would constitute the minimum size for a secure Scotian Shelf population of northern bottlenose whales. The population is small but was stable between 1988 and 2003. Little is known about historical population sizes and so it is not clear if it was much larger than its present day size. The population may have always been small. There is no evidence to suggest that the Scotian Shelf population of northern bottlenose whale has reduced its geographic range. Given the paucity of information on the historical population size, the recovery target is to maintain a stable or increasing population and to maintain, at a minimum, current distribution.

There are no estimates of abundance for the Davis Strait population. Recent surveys have resulted in few sightings. The distribution of the Davis Strait population is not known to have changed. Despite the scant information, the whales are still found in the areas where whaling was reported. Given the paucity of information on the historical population size, the proposed recovery target for the Davis Strait population is to achieve an increasing population size and to maintain, at a minimum, current distribution. A minimum numerical target would be a population size greater than 818 individuals as this many were removed by whalers between 1969 and 1971.

Sources of Harm and Mortality

The human-induced threats causing most concern are anthropogenic ocean noise and commercial fishing.

Potential sources of acoustic disturbance include military exercises (SONAR, detonations), marine scientific research using sound, oil and gas exploration and extraction, vessel traffic, aircraft traffic, and construction. The threat posed by oil and gas development was part of the reason that the Scotian Shelf population was designated Endangered in 2002. There have been no documented cases of harm or mortality to a northern bottlenose whale in Canada due to ocean noise.

Waters off Nunavut have not been subject to seismic exploration in recent years and no new commercial surveys are proposed. Most of the longer duration seismic programs approved for offshore Newfoundland and Labrador have been associated with active exploration licenses far south of the Davis Straits population centre. There have been no full commercial seismic exploration programs conducted offshore Nova Scotia since 2006. Haldimand and Shortland canyons are considered areas of potential for oil and gas extraction. Activities related to oil and gas extraction may resume in these canyons in the near (1-3 yrs) future.

Frequency of entanglements and incidental catch of northern bottlenose whales in fishing gear appears to be low. Some incidents have been reported but the resultant mortality rate was not quantified. During the past 30 years, only nine entanglements or catches have been documented in Canadian waters, five of which were reported from the Scotian Shelf, one from the Grand Banks, and three from the Davis Strait area. Of these, two whales were released alive, one was presumed to have sustained fatal injuries, and one was reported as dead. The condition of the other whales upon release is not known.

The entanglements or bycatch on the Scotian Shelf and adjacent areas include interactions with trawl (targeting squid or silver hake) and pelagic longline (targeting swordfish). Of the three fisheries implicated in the reported entanglements, only one is still active. The squid fishery is no longer prosecuted. The foreign silver hake fishery on the edge of the eastern Scotian Shelf (referred to as the silver hake box) has also closed. The swordfish longline fishery, as well as other pelagic longline fisheries, is still conducted in areas of known northern bottlenose whale distribution.

In the Davis Strait area, a fisherman reported a dead northern bottlenose whale caught in a Greenland halibut gillnet. Fisheries observers reported one whale wrapped in longline targeting Greenland halibut, which was released alive. Another reported a whale caught by trawler fishing for Greenland halibut. Fishing effort in a Greenland halibut longline has been greatly reduced as participants changed to other gear types.

Entanglements and bycatch may occur more frequently but are not observed or reported. Although the magnitude of mortality due to entanglement and incidental catch cannot be quantified, it is presumed to be low.

Future climate change and trophic changes are potential threats to the quality of northern bottlenose habitat. No reduction in habitat quantity or quality has been documented to date. Activities that would alter the seabed, such as large scale mining, or construction of structures that could impede access to or movement within habitat (such are oil and gas platforms) or a large-scale fishery for *Gonatus* squid are other potential threats. No such activities are currently being undertaken.

Mitigation Measures and Alternatives

DFO has developed a Statement of Canadian Practice on the Mitigation of Seismic Noise in the Marine Environment which outlines planning considerations, assessment protocols, and mitigation measures that should be taken into account when conducting seismic surveys. This focuses on procedures for reducing the risk of harm to marine mammals, especially threatened and endangered species. The Statement of Practice has been adopted and implemented by hydrocarbon regulators throughout the Canadian range of northern bottlenose whales including Indian and North Affairs Canada (INAC), the Canada-Newfoundland and Labrador Offshore Petroleum Board (CNLOPB), and the Canada-Nova Scotia Offshore Petroleum Board (CNSOPB). The minimum requirements may not be sufficient to ensure protection of northern bottlenose whales. The Canadian Navy has developed marine mammal mitigation procedures to follow when conducting Exercises-Operations that involve the use of Underwater Sound Generating Systems.

To mitigate harm and mortality due to entanglements, a reasonable approach would be to educate members of the fishing industry on safe handling and release techniques should a whale be caught. The practice of feeding whales from fishing boats should also be discouraged. This practice causes the whales to approach fishing vessels and puts them at increased risk of entanglement. Closed areas, should areas with high risk of entanglement be identified, could also be implemented.

For those fisheries implicated in entanglements, alternatives could include a change in gear type. Other gear types could be used to catch swordfish such as harpoon and trolling gear. Both mobile (bottom trawl) and fixed (gillnet and longline) gear types in the Greenland halibut fishery have been implicated in northern bottlenose whale entanglements. Thus, there is no reasonable alternative.

Sources of Uncertainty

The range limits of the two populations needs to be determined. Historical range is not fully known. More survey effort is needed to fully describe the distribution and abundance of northern bottlenose whales in Canada, particularly in the northern part of its distribution and around Newfoundland. The stock origin of the whales sighted around the Grand Banks, and in what capacity they are using that area, should be determined.

The abundance and distribution of *Gonatus* squid, an important component of northern bottlenose whale habitat, are not known. Further study of northern bottlenose diet in Canadian waters is required to identify areas of important habitat.

Mortality due to entanglement and incidental catch of northern bottlenose whales in commercial fishing gear is not well quantified. The long-term survival of the whales that are released is not known. Also, it is possible that some entanglements are not reported.

SOURCES OF INFORMATION

This Science Advisory Report is from the Fisheries and Oceans Canada, Canadian Science Advisory Secretariat meeting of the National Marine Mammal Peer Review Committee (NMMPRC) of November 22-26. Additional publications from this process will be posted as they become available on the DFO Science Advisory Schedule at http://www.dfo-mpo.gc.ca/csas-sccs/index-eng.htm.

COSEWIC. 2002. COSEWIC Assessment and Update Status Report on the Northern Bottlenose Whale *Hyperoodon ampullatus* (Scotian Shelf Population) in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vi + 22 pp.

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